CLAIMS:

1. A system for determination of a direction to an object emitting and/or reflecting electromagnetic radiation, the system comprising:

a first pair of linearly polarized antennas having a first type of polarization and separated by a first predetermined distance defining a first baseline, said first pair of linearly polarized antennas configured for receiving a polarized signal of the first type of polarization originated from the object;

a second pair of linearly polarized antennas having a second type of polarization orthogonal to the polarization of the first pair and separated by a second predetermined distance defining a second baseline, said second pair of linearly polarized antennas configured for receiving another polarized signal of the second type of polarization originated from the object, the first baseline and the second baseline intersecting at right angles to define four quadrant parts;

four receivers coupled to the linearly polarized antennas of the first and second pairs, wherein each of the four receivers is associated with at least one pair of the antennas includes a phase shifter configured to receive polarized signals, to provide a required phase shift to the received polarized signals, and to generate corresponding phase-shifted polarized signals; and

a signal processing system coupled to said four receivers, and configured (a) to combine the phase-shifted polarized signals originated from said at least one pair of the antennas with non-shifted signals originated from another pair of the antennas, thereby forming four virtual antennas having a desired polarization with phase centers located in said four quadrant parts, correspondingly; and (b) to process the signals having the desired polarization associated with said four virtual antennas for generating at least one direction parameter of the object.

2. The system of claim 1, wherein said at least one direction parameter of the object is selected from at least one of an object elevation angle or~~and~~ an object azimuth angle.

3. The system of claim 1, wherein the first type of polarization and the second type of polarization are two perpendicular linear polarizations.

4. The system of claim 3, wherein said required phase shift to said received polarized signals is 90^{0}°.

5. The system of claim 3, wherein said desired polarization of the virtual antennas is a circular polarization.

6. The system of claim 1, wherein each of the four receivers includes an amplifier/attenuator configured for tuning power of the polarized signals received on apertures of at least one pair of the linearly polarized antennas.

7. The system of claim 1, wherein the signal processing system is configured for analog signal processing of the signals having the desired polarization associated with said four virtual antennas.

8. The system of claim 1, further comprising four analog-to-digital converters arranged upstream to the signal processing system configured for digital processing of the signals having the desired polarization associated with said four virtual antennas.

9. The system of claim 1, further comprising four transmitters coupled to the linearly polarized antennas of the first and second pairs and isolated from said four receivers by corresponding duplexers.

10. The system of claim 9, wherein each of the four transmitters includes a source of radio frequency radiation and a T_R phase shifter configured to provide required phase shifts to the signals provided by the source of radio frequency radiation to generate corresponding phase-shifted signals for transmitting towards the object.

11. The system of claim 9, wherein each of the four transmitters includes a T_R amplifier/attenuator configured for tuning power of the polarized signals transmitted on apertures of the linearly polarized antennas of the first and second pairs.

12. A method for determination of a direction to an object emitting and/or reflecting electromagnetic radiation, the method comprising:

providing a first pair of linearly polarized antennas having a first type of polarization and separated by a first predetermined distance defining a first baseline, said first pair of the linearly polarized antennas configured for receiving a polarized signal originated from the object;

providing a second pair of linearly polarized antennas having a second type of polarization orthogonal to the polarization of the first pair and separated by a second

predetermined distance defining a second baseline, ~~–~~said second pair of linearly polarized antennas configured for receiving another polarized signal originated from the object, the first baseline and the second baseline intersecting at right angles to define four quadrant parts;

providing four receivers coupled to the linearly polarized antennas of the first and second pairs, wherein each receiver associated with at least one pair of the antennas includes a phase shifter configured to receive polarized signals, to provide a required phase shift to the received polarized signals, and to generate corresponding phase-shifted polarized signals;

receiving a polarized signal which originated from the object by said first pair of the linearly polarized antennas;

receiving another polarized signal which originated from the object by said second pair of the linearly polarized antennas,

providing required phase shifts to the received polarized signal which originated from said at least one pair of the antennas selected from at least one of the first or~~and~~ second pairs, and generating corresponding phase-shifted polarized signals;

combining the phase-shifted polarized signals originated from said at least one pair of the antennas with non-shifted signals originated from another pair of the antennas, thereby forming four virtual antennas having a desired polarization with phase centers located in said four quadrant parts, correspondingly; and

processing the signals having the desired polarization associated with said four virtual antennas for generating at least one direction parameter of the object.

13. The method of claim 12, wherein the processing of the signals having the desired polarization for generating at least one direction parameter of the object comprises applying a monopulse tracking technique, includes~~ing~~:

summing signals received from said four virtual antennas formed in said four quadrant parts to calculate a four antennas sum signal (Σ);

summing received signals associated with any two neighboring virtual antennas selected from said four virtual antennas to calculate a first two antennas sum signal and summing received signals associated with two other neighboring virtual antennas to calculate a second two antennas sum signal;

generating a difference signal (Δ) between said first two antennas sum signal and said second two antennas sum signal; and

processing said four antennas sum signal (Σ) and said difference signal (Δ) for generating said at least one direction parameter of the object.

14. The method of claim 12, wherein the processing of the signals having the desired polarization for generating at least one direction parameter of the object comprises applying an interferometry technique, includesing:

generating a phase difference signal between the received signals associated with a pair of virtual antennas formed in two quadrant parts selected from said four quadrants, said two quadrant parts being oppositely located with respect to an intersection point of the first baseline and the second baseline;

calculating a distance between phase centers of the virtual antennas formed in said two quadrant parts; and

processing said phase difference signal and the distance between the phase centers for generating said at least one parameter of the object.

15. The method of claim 12, further comprising tuning of a power of the polarized signals received on apertures of at least one pair of the linearly polarized antennas, thereby varying location of the phase centers of the virtual antennas within space of said four quadrant parts.

16. The method of claim 12, further comprising varying phases of the polarized signals received by at least one pair of the linearly polarized antenna to provide required phase shifts to the received polarized signals.

17. The method of claim 16, wherein said required phase shift to the received polarized signals is 90°.

18. The method of claim 12, wherein said two types of polarization are two perpendicular linear polarizations.

19. The method of claim 12, further comprising providing four transmitters coupled to the linearly polarized antennas of the first and second pairs and isolated from said four receivers by corresponding duplexers, wherein each transmitter includes a radio frequency radiation and a T_R phase shifter configured to provide required phase shifts to the signals provided by the source of radio frequency radiation.

20. The method of claim 19, comprising:

-generating radio frequency radiation;

providing required phase shifts to the signals provided by the source of radio frequency radiation;

generating corresponding phase-shifted signals; and

transmitting the phase-shifted signals towards the object.